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# United States Department of Agriculture,

BUREAU OF PLANT INDUSTRY,

Demonstrations on Reclamation Projects,

WASHINGTON, D. C.



## ESTABLISHING THE SWINE INDUSTRY ON THE NORTH PLATTE RECLAMATION PROJECT.

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With an introduction by F. D. FARRELL, *Agriculturist in Charge.*

### INTRODUCTION.

In the act of Congress approved June 30, 1914, making appropriations for the Department of Agriculture for the ensuing fiscal year, an appropriation was made "to enable the Secretary of Agriculture to encourage and aid in the agricultural development of the Government reclamation projects; to assist, through demonstrations, advice, and in other ways, settlers on the projects." In order to carry out this provision of the appropriation act there was immediately established in the Department of Agriculture the Office of Demonstrations on Reclamation Projects. This office is charged with the establishment and supervision of demonstration work, with a view to assisting the settlers in developing agricultural industries in the regions where irrigation water is provided by the United States Reclamation Service.

The agriculture of some of the reclamation projects is centered around the production of fruit and other specialized crops, but on most of the projects the agriculture is based primarily on the production of forage crops and grain. During the year 1913, crops were harvested from 642,216 acres on 24 reclamation projects. Of this an area of 315,428 acres, or 49.1 per cent, was devoted to alfalfa and other forage crops, and 191,022 acres, or 29.8 per cent, to the production of grain. Forage and grain crops, therefore, occupied 78.9 per cent of the cropped acreage.

The 24 reclamation projects are located in 15 Western States. Most of them are far removed from the large consuming centers, so that after the first few years the problem of disposing of the crops produced is usually the most important difficulty with which the farmers are confronted. Such products as hay and grain do not bear the



high cost of transportation from the projects to the large market centers. After the small local demands are satisfied, the prices which the farmers receive for these products are never greater than the prices paid at the market centers less the cost of transportation from the projects to the markets. Hence, the local prices are usually so low that the farmers can not obtain a profit from the direct sale of hay and grain.

In view of these facts it appeared advisable that the first efforts of the demonstration work be directed chiefly toward solving the problem of crop disposal. One of the best ways to do this is to convert the crops into products which will bear transportation charges. This involves the establishment of live-stock industries, particularly on those projects where forage and grain crops predominate.

The conditions on the North Platte project will serve to illustrate this point. According to statistics collected by the United States Reclamation Service, about 55 per cent of the cropped acreage on this project in 1913 was devoted to the production of alfalfa and 32 per cent was devoted to grain. In that year the local price of alfalfa was \$3 to \$5 a ton and the prices of the different grains ranged from 40 to 70 cents per bushel. During the same year experiments conducted at the experiment farm on the project showed that alfalfa when pastured by hogs had a value equivalent to as much as \$35 a ton and that when corn was "hogged off" its value as a hog feed was from 90 cents to \$1 a bushel. In other words, these experiments showed that by converting the alfalfa and corn into pork the farmers could expect to obtain very satisfactory prices from these two important crops.

It therefore appeared desirable to encourage the establishment of the swine industry on the North Platte project. A number of farmers had already begun to raise hogs, as is evidenced by the fact that there were about 14,000 hogs on the project on November 1, 1913. Thus, there was a good nucleus around which a large industry could be built up. As the accompanying report shows, the swine industry on the project developed very rapidly in 1914, the gross receipts from the sale of hogs in that year having been close to \$250,000. There seems to be no good reason why the industry should not soon develop to a point where it will bring to the project at least \$1,000,000 a year.

The swine industry appears to be admirably suited to the conditions on the North Platte project. Forage crops and grain, particularly alfalfa and corn, can be produced cheaply and in abundant quantities; comparatively little capital is required to finance a farmer in starting the swine industry; the hogs pay good returns for the crops consumed, the returns come quickly, and the swine population increases rapidly. The success of the industry depends

largely on the following: (1) The standardization of breeds in the community; (2) the practice of satisfactory methods of breeding, feeding, housing, and marketing; (3) adequate control of diseases and pests affecting swine; and (4) community cooperation, particularly in connection with breeding, marketing, and the control of diseases.

The North Platte Reclamation Project is located in the extreme western part of Nebraska and the extreme eastern part of Wyoming. It extends southeastward from Whalen, Wyo., about 60 miles, approximately 94 per cent of the project being in Nebraska. The project covers a narrow strip of land on the north side of the North Platte River and includes approximately 100,000 acres of irrigable land. The altitude of the irrigable area averages about 4,100 feet. The average annual precipitation is about 15 inches, most of which comes during April to September, inclusive. The extreme range of temperature is from  $-25^{\circ}$  to  $104^{\circ}$  F. The irrigation season extends from April 1 to October 1. During the year 1914 there were 944 farm units operated on the project. The maximum area per farm unit is 80 acres for public lands and 160 acres for lands which were in private ownership at the time the project was opened.

The chief crops grown on the project are alfalfa, hay, grain, sugar beets, and potatoes. The acreages, yields, and farm values of the leading crops grown on the project in 1914, according to figures furnished by the United States Reclamation Service, are shown in Table I.

TABLE I.—*Acreage, yields, and farm values of the principal crops grown on the North Platte Reclamation Project in 1914.*

Crops.	Area (acres).	Unit of yield.	Yields.		Farm values.	
			Total.	Average per acre.	Per unit of yield.	Total.
Alfalfa hay.....	32,464	Ton.....	71,405	2.2	\$4.50	\$321,322
Oats.....	7,017	Bushel..	146,211	20.8	.40	58,484
Corn.....	6,024	..do....	93,186	15.5	.75	69,889
Sugar beets.....	5,083	Ton.....	53,282	10.5	5.50	293,051
Barley.....	2,261	Bushel..	53,022	23.4	.60	31,813
Potatoes.....	1,097	..do....	159,027	145.0	.35	55,659
Alfalfa seed.....	922	..do....	863	.9	8.00	6,904
Wheat.....	609	..do....	9,979	16.4	.85	2,482
Rye.....	245	..do....	1,363	5.6	.70	954
Stock beets.....	215	Ton.....	3,334	15.5	4.00	13,336
All other crops.....	3,599					
Less duplications.....	3,892					
Total cropped.....	55,644					

It is shown in Table I that the great bulk of the cropped acreage in 1914 was devoted to the production of hay and grain. If from the total area in crops the sum of the acreage in sugar beets, potatoes, gardens, and millet seed is deducted—an aggregate of 6,528 acres—there remains an area of 49,116 acres which was used for hay,



grain, and pasture. In other words, 88 per cent of the cropped area in 1914 produced forage and grain, crops which are best disposed of by feeding to live stock. This is true particularly in the case of alfalfa, the most important crop on the project. In 1914, because of the large surplus of alfalfa hay and the lack of a satisfactory market, this hay was valued at only \$4.50 per ton in the stack. Even at this low price the total production was valued at \$321,322. By the proper use of live stock in utilizing alfalfa the value of the 1914 crop could readily be trebled or quadrupled. Swine production offers one of the best methods of disposing of alfalfa and some of the grain crops.

A study was made in the fall of 1914 to see what proportion of each of several of the more important crops was grown by farmers who kept hogs on their farms. Of the 944 farmers on the project in 1914, 530, or 56 per cent, kept hogs. This 56 per cent of the farmers cultivated 67 per cent of the total cropped acreage of the project, 73 per cent of the alfalfa acreage, 65 per cent of the acreage in barley, 57 per cent of the acreage in corn, 55 per cent of the wheat acreage, and 69 per cent of the land devoted to sugar beets. In other words, the swine growers cultivated more than their proportionate acreage of all the crops specified except wheat. This shows that hog production did not tend to restrict the farmers in growing the common farm crops and indicates that the swine growers were, comparatively, the most extensive farmers. It is likely that the farmers' ability to increase their cultivated acreage has been coincident with their desire and ability to get started in the swine industry.

In order to encourage and aid in the development of this industry, arrangements were made whereby the Bureau of Animal Industry stationed Mr. Charles S. Jones on the project in May, 1914, to assist the settlers in solving the problems of swine production. On July 1, 1914, Mr. Jones was transferred to the Office of Demonstrations on Reclamation Projects and continued his work, with headquarters at Mitchell, Nebr.

While the Office of Demonstrations on Reclamation Projects bears all the expenses of the field men in this demonstration work, cooperation is had with other agencies interested in the agriculture of the projects. These agencies include the State agricultural colleges and experiment stations, State live-stock sanitary boards, the various divisions of the Department of Agriculture, and the United States Reclamation Service. This cooperation makes it possible for the field men to place before the farmers on the projects the most reliable agricultural information available and facilitates the directing of the activities of the several agencies toward the solution of the problems confronting the farmers. In the work herein reported close cooperation was had with the University of Nebraska, the Nebraska

State Live-Stock Sanitary Board, the Office of Western Irrigation Agriculture of the Bureau of Plant Industry, the Animal Husbandry Division of the Bureau of Animal Industry, and the North Platte project office of the United States Reclamation Service.

The following report by Mr. Jones is a brief statement of the demonstration work in swine production on the North Platte Reclamation Project from July 1 to December 31, 1914. This report illustrates some of the methods pursued by the Office of Demonstrations on Reclamation Projects in assisting farmers in the establishment of agricultural industries. In this work no attempt is made to encourage farmers to engage in any industry exclusively, but, on the other hand, efforts are directed toward the successful establishment of a major industry with the proper relationships to other features of diversified agriculture in the region.

#### EXTENT OF THE SWINE INDUSTRY ON THE PROJECT.

According to figures furnished by the United States Reclamation Service, there were on the project 14,000 hogs on November 1, 1913, and 22,241 on November 1, 1914. The increase during the year amounted to about 8,000 head, or 60 per cent. These 22,241 hogs were grown on 530 farms; in other words, 530 of the 944 farmers on the project, or 56 per cent, grew hogs in 1914. A large number of other farmers expressed their intention of getting into the hog business, and many of the present swine growers are planning to increase the size of their herds.

Hogs are grown in all eight of the districts into which the project is divided. The number of swine growers and the number of swine on the farms of each district on November 1, 1914, are shown in Table II.

TABLE II.—*Number of swine growers and number of swine in each district on the North Platte Reclamation Project, November 1, 1914.*

District.	Number of growers.	Number of swine.		District.	Number of growers.	Number of swine.	
		Total.	Average per farm.			Total.	Average per farm.
Third lateral.....	107	4,505	42	Sheep Creek.....	28	1,263	45
Spotted Tail .....	37	1,494	40	Dry Sheep Creek...	49	2,664	54
Sunflower.....	89	2,755	31	Pleasant Valley....	78	2,322	30
Iowa Flats.....	26	1,352	52				
Dutch Flats.....	116	5,886	52	Entire project..	530	22,241	42

Table II shows that the 530 farms on which hogs were kept in 1914 carried an average of 42 head per farm on November 1, 1914. The average varied from 30, in the Pleasant Valley district, to 54, in the Dry Sheep Creek district. A fuller discussion of the size of the herds is given later.



## PRESENT METHODS OF MANAGEMENT.

In order that the demonstration work might be as effective as possible, considerable time was devoted to the collection of information relative to the various methods of management practiced on the project. One of the important features of the work is the dissemination of this information among the farmers, special emphasis being placed on the profitable practices, which should be more widely followed, and on unprofitable practices, which should be discontinued or avoided. There is given below a brief statement of some of the more important features of the methods of management now followed by the swine growers on the project, together with some suggestions relating to possible improvements in the prevailing conditions.

*Size of herd.*—As previously stated, the average size of herd on the entire project on November 1, 1914, was 42 head. The number kept on individual farms varied from less than 10 to (in one case) more than 600. There were 12 farms on each of which more than 200 hogs were kept, and 45 farms carried more than 100 hogs each. The great majority, about 75 per cent, of the swine growers had less than 50 hogs each, while about 25 per cent of the farmers had less than 10 hogs each. These figures apply to the conditions on November 1, 1914, after a large number of hogs kept during the summer had been marketed. They are probably somewhat in excess of the number of swine which were to be carried through the winter of 1914-15.

From the wide variation noted, it appears that the average size of the herds could well be greatly increased. With a few farmers successfully growing more than 200 head each there is good reason to believe that most men on farms of about the same size could very profitably increase the size of their herds. There are ample facilities for producing all the feed necessary for four or five times as many hogs as are now grown on the project. This increase should come through the establishment of herds on farms which now do not carry hogs and through the increase in the size of the present swine herds. There seems to be no question that there will soon be a large increase in the swine population on the project, and there can be no doubt that the increase can be fully justified. Most of the present growers are just getting started in the industry, and they will probably provide for large increases in their herds within the next few years.

*Breeds.*—It is extremely fortunate for the swine industry on the project that there is not a wide intermixture of breeds. The Duroc-Jersey breed is by far the most popular, the animals of this breed



outnumbering all others by about 10 to 1. A small number of Poland China hogs are grown, and there are a few white hogs.

About 90 per cent of the hogs on the project are grades of a fairly good type. Both the red and the black hogs do well on the project, but because of the hot sunshine during the summer months the white hogs "blister" to some extent and are not to be recommended.

The fact that the farmers are almost unanimous on the question of breeds gives them an advantage which is enjoyed by very few other communities of irrigation farmers. It is urged that this advantage be preserved by a continuation of the one-breed practice, since it will be very helpful to the swine growers in herd improvement by community breeding, in disposing of surplus breeding animals, and in marketing the annual pig crop. While both the Duroc-Jerseys and the Poland Chinas do well on the project, the raising of Duroc-Jerseys is advocated, not because it is believed that these hogs are superior to the Poland Chinas as a breed but because they are at present so much in the majority, thus facilitating improvements and economies which are difficult to secure where several breeds are grown in one community.

*Pure breeds.*—About 10 per cent of the hogs on the project are pure bred. Most of these are of a fairly good type, but there is need for considerable improvement in the pure breeds which are used for breeding purposes. During the six months ended December 31, 1914, 42 pure-bred boars were shipped to the project, most of them coming from eastern Nebraska. In most cases these males will be used for one or two crops of pigs and then fattened for market.

There are a number of herds of pure-bred hogs on the project and in eastern Nebraska. It is suggested that prospective buyers look into the possibility of obtaining desired breeding stock from these herds before ordering from distant points. During the summer of 1914 several farmers sent away for pure-bred hogs, when they could have obtained just as good animals at less cost on the project had they had the necessary information. One of the features of the demonstration work is to assist farmers in locating and selecting breeding stock.

Local interest in herd improvement is growing rapidly. Three sales of pure-bred hogs were held in the valley during the autumn of 1914. The offerings were mostly spring pigs, and the prices varied from \$10 to \$50, according to sex and individual quality. As a rule, the males sold for more than the gilts.

*Breeding practices.*—It is a common practice among the farmers on the project to make exclusive use of young sows for breeding purposes and to market these sows as soon as possible after they have produced one litter of pigs. This practice appears to be inadvisable.

since it makes it impossible to build up a strong herd by more extensive use of the best sows. It is likely also to result in decreased vitality. The more successful swine growers on the project do not follow the practice, and it is noticeable that their hogs are above the average in strength and vigor.

The leading swine growers of the valley raise two litters a year. This practice is recommended where satisfactory winter quarters are provided for the sows and pigs. Where adequate shelter and warmth are lacking, large losses occur in the fall litters during cold weather. During the month of December, 1914, these losses were very heavy, exceeding 33 per cent in many instances.

The fall litter should be farrowed early enough to allow the pigs to make a good growth before very cold weather. This will usually necessitate farrowing between August 15 and September 30. The winter quarters of the fall pigs need not be large. While it is necessary to feed more grain during the winter than during the summer, not nearly so much grain is required during the winter by fall pigs as is necessary for pigs farrowed in midsummer. For this reason fall pigs can be wintered at comparatively low cost. They can be very economically fattened the following summer on grain and alfalfa pasture and marketed soon after midsummer. Pigs farrowed in the spring, between March 1 and April 30, can get most of their growth while running on alfalfa pasture and receiving a 2 to 3 per cent ration of grain. With this ration in the summer, followed by a heavier ration in the fall, they can be finished very economically for market before Christmas.

*Feeding.*—It is a general practice on the project to pasture hogs on alfalfa from early May until about the middle of October and to supplement the alfalfa pasture with a light ration of grain. During the winter alfalfa hay is supplemented with grain and frequently with stock beets or sugar beets.

On the average, an acre of alfalfa furnishes ample grazing for twelve 100-pound shotes, but more than this can be carried on good fields if proper methods are followed. The best results are obtained when the pasture is divided into two parts, which are pastured alternately. It is advisable to avoid excessive pasturing at all times. It is better to provide somewhat more alfalfa pasture than the hogs can feed down closely and to clip the hog pasture at the time of each cutting of the general alfalfa crop. If two pastures are not provided, it is advisable to clip about one-half the pasture first, and then, in about 10 days, to clip the other half. This allows the part first clipped time in which to grow up and furnish feed after the second part is clipped.

The quantity of grain fed to shotes on alfalfa pasture varies widely among the farmers on the project. Some farmers feed no



grain to their shotes, but as a general rule the more successful swine growers feed about a 2 per cent grain ration. It appears that the net returns from an acre of alfalfa grazed by hogs increase as the grain ration is increased, at least until the ration amounts to about 3 per cent, or 3 pounds a day, for each 100 pounds of live weight. Whether a grain ration as heavy as this or heavier should be fed will, of course, depend largely on the cost of the grain used. Under ordinary conditions a 2 to 3 per cent ration can be made profitable.

It is commonly believed among farmers on the project that higher returns from alfalfa can be secured by hog pasturing than by any other method. It is certain that the hog affords one of the very best methods of disposing of alfalfa, and the farmers on the project can well prepare to make more extensive and more efficient use of hogs in this connection.

Occasionally alfalfa hay is ground and fed to hogs. As a rule, however, this practice is not profitable, particularly when the market price for alfalfa hay is as low as it has been during recent years. The price usually has been from \$4.50 to \$5.50 per ton for hay in the stack.

Corn is the principal grain used on the project to supplement alfalfa pasture and alfalfa hay as a ration for hogs. Corn can be grown very successfully. While the average yield secured in 1914 from 6,000 acres of corn was only  $15\frac{1}{2}$  bushels per acre, a large number of farmers secured yields of 40 bushels per acre and a few reported yields above 60 bushels. The total production of corn on the project is not now sufficient to supply local needs, so that a quantity is shipped in each year, chiefly for the use of swine growers. This imported corn is usually shelled and it is ordinarily fed without grinding. A few farmers grind and soak the corn which is fed to hogs. Ordinarily, however, it is best to feed the corn without either grinding or soaking, particularly for young pigs or shotes.

During the fall of 1914 a few farmers tried "hogging down" their corn. The results were very satisfactory. The dry weather which usually prevails during the autumn months is very favorable to this practice, so that practically no corn is wasted by the hogs or left in the field. The cost of fencing a field preparatory to "hogging down" is about equal to the cost of harvesting the corn by the usual method and feeding it to the hogs in the dry lot. The fence is then left for future use. Many farmers have expressed their intention to try this method in the future. The "hogging-down" method is an inexpensive way of harvesting corn and feeding it to hogs; it also adds a considerable quantity of fertilizer to the soil. It appears certain that the method should be widely followed on the North Platte project.



Only a comparatively small acreage of barley is grown on the project. While the average yield on the 2,261 acres devoted to barley in 1914 was only 23.4 bushels per acre, some fields yielded as much as 90 bushels per acre.

During the summer of 1914 several farmers on the project fattened hogs on ground barley fed in self-feeders while the hogs had access to alfalfa pasture. The hogs fattened rapidly and the farmers were well pleased with the results. It is usually advisable to mix at least a small quantity of corn or wheat with the barley. Ground barley and wheat mixed in equal proportions have also been used with good results. Only a small quantity of wheat is grown on the project and very little is shipped in for hog feed, so that the use of



FIG. 1.—An unsatisfactory hog house and an unsanitary wallow hole on the North Platte Reclamation Project. Such quarters greatly increase the danger of damage from disease and unfavorable weather.

wheat as a feed for hogs is not extensive. When barley or wheat is fed to hogs, the feeding value is increased by rolling or grinding. Barley should be rolled rather than ground.

A rather large number of the farmers on the project used self-feeders in 1914. It is estimated that the self-feeders in use in that year was twice as great as the number used in 1913. The reports are very favorable. The use of self-feeders is recommended.

*Housing.*—Some very good hog houses are found on the project, but as a rule the hogs are very inadequately housed. A view of unsatisfactory quarters is shown in figure 1. Much of the heavy loss of young pigs at farrowing time is due to a lack of satisfactory quarters for the sows and pigs. The chief requirements of a satis-

factory farrowing house are warmth, sunshine, good ventilation, and dryness. Several of the swine growers have already begun to improve their hog-housing facilities and have made use of building plans furnished them in connection with the demonstration work. Farmers who expect to build hog houses will be furnished plans of various types of buildings on request. These plans are for houses which are well adapted to conditions on the project and which can be built at relatively small expense. Some inexpensive portable farrowing houses are illustrated in figure 2. There can be no doubt that the large losses now experienced by many of the swine growers could be very greatly reduced and the profits of the industry much increased if better housing facilities were provided.

*Marketing.*—Practically all the fat hogs sold from the project are marketed in Denver. The Denver market is comparatively favor-



FIG. 2.—Inexpensive portable farrowing houses on the North Platte Reclamation Project. One side of each house is hinged, so that it may be opened during hot weather for shade and ventilation.

able for two reasons: (1) The freight rate to Denver is only 23 cents per 100 pounds in carload lots, as compared with 30.6 cents to Omaha and 42.5 cents to Kansas City; and (2) the prices in Denver are usually from 5 to 10 cents per hundredweight higher than at the two other markets. The shipping facilities are fairly satisfactory. By shipping on certain days of the week, the swine grower can place his hogs on the Denver market in from 24 to 30 hours after they are loaded on the cars at points on the project.

As a rule, only fat hogs are shipped; but during the fall of 1914, because of the high price of corn, many farmers sold their spring and summer crops of pigs as shotes. Most of these were purchased by feeders from eastern Nebraska, where they were to be used chiefly to follow steers in the feed lots.

Approximately two-thirds of the fat hogs raised on the project are shipped by the farmers and one-third are sold to local buyers. There is some cooperative marketing by farmers, chiefly, however, in



cases where a single farmer does not have enough fat hogs to make up a car, in which case two or more farmers load and ship together. Cooperative shipping might well be extended. One of the advantages of direct cooperative marketing is that it saves the swine grower the margin paid to local buyers. These buyers usually buy on a "dollar margin"; that is, they pay \$1 per 100 pounds below the Denver market. This gives them a profit of about 40 cents per 100 pounds, after paying the freight, selling commissions, and other expenses, and allowing for shrinkage.

From July 1 to December 31, 1914, there were shipped from the valley  $135\frac{1}{2}$  cars of hogs. These figures do not represent the total shipments of the 1914 hog crop, but on the other hand the figures may be somewhat higher than they would have been for the six-month period if corn prices had been lower, although this is not certain. The shipments made each month from July to December, inclusive, the average prices f. o. b. valley points, and the approximate receipts are shown in Table III.

TABLE III.—*Hog shipments from the North Platte Reclamation Project from July 1 to December 31, 1914.*

Month.	Number of cars.	Average net price per 100 pounds.	Receipts.	Month.	Number of cars.	Average net price per 100 pounds.	Receipts.
July.....	13	\$8.45	\$19,700	November.....	25	\$6.90	\$31,050
August.....	14	8.50	21,620	December.....	$28\frac{1}{2}$	6.60	33,858
September.....	27	8.20	40,338				
October.....	28	6.80	34,272	Six months....	$135\frac{1}{2}$	7.42	180,838

As shown in Table III, the total receipts for hogs during the last half of 1914 amounted to over \$180,000. It is also shown that most of the hogs shipped during the last half of 1914 were sold at relatively low prices. Of the  $135\frac{1}{2}$  carloads shipped, 54 carloads were sold at prices exceeding \$8 per 100 pounds, while  $81\frac{1}{2}$  carloads were sold for less than \$7 per 100 pounds. It is usually found that pork prices decline sharply during the fall and winter months. For this reason, the raising of fall pigs has some distinct advantages, it being possible to finish fall-farrowed pigs for shipment during the months of July, August, and September, when the prices usually are comparatively high.

#### CONTROL OF DISEASES AND PESTS AFFECTING SWINE.

In some respects natural conditions on the project are conducive to comparative freedom from diseases affecting swine. The light rainfall, abundant sunshine, fairly good drainage conditions in most sections, and the availability of excellent feeds all contribute to the



health of the hogs and so increase resistance to diseases of various kinds; and the climatic and soil conditions make it comparatively easy to maintain sanitary quarters for the animals. On the other hand, the universal use of irrigation water, which is distributed over the project by a network of canals and laterals, furnishes a very effective means of spreading such a disease as hog cholera when it invades the region. The danger of the dissemination of disease by irrigation water is something to which farmers should give careful attention. Effective control of this danger is possible only through community cooperation, with rigid regulation.

The success of the swine industry on the project depends very largely on prevention and control of swine diseases and of various pests which affect hogs. In the demonstration work in 1914 particular attention was paid to this matter. A brief discussion of the conditions found and the work accomplished is given below.

#### HOG CHOLERA.

##### FIRST APPEARANCE.

When the writer reached the project in May, 1914, hog cholera was found to be widespread, and the demonstration work was directed toward getting the disease under control. Prior to the summer of 1913 hog cholera was practically unknown, or at least unnoticed, on the project. During that summer hogs could be purchased in eastern Nebraska and Kansas at comparatively low prices on account of the prevalence of drought in those sections. Several carloads of hogs were brought from those sections to the project, where they were sold to farmers and distributed widely. Many of these hogs died of cholera soon after their arrival. In this way the disease was widely disseminated. On account of the cholera in this case being the sub-acute form, many farmers did not believe the disease to be cholera. The result was that practically no precautions were taken to prevent its spread. When the demonstration work was started hog cholera outbreaks had occurred in several localities. Because of the universal use of irrigation water the disease spread more rapidly, perhaps, than it would in a nonirrigated section, and it was evident that prompt action must be taken if the swine industry was to be maintained.

Accordingly, steps were taken to ascertain the extent of the prevalence of the disease on the project. All herds known to be affected were visited, the hogs were treated with antihog-cholera serum, and the herds quarantined. A canvass was made of the farms where the disease had occurred and a campaign of eradication was instituted. The farmers were urged to clean up and disinfect their premises by burning all litter around the hog lots and hog houses and by disinfecting the quarters occupied by hogs. The farmers generally coop-

erated very effectively in this work and the results were in most cases satisfactory. Up to December 31, 1914, only two cholera outbreaks occurred on farms where the disease had been present in 1913, and it is believed that in both of these cases the outbreaks were due to infection from the outside rather than to harbored infection. To supplement the personal visits to the farms where the disease was known to have been present in 1913 a circular letter was sent to all the farmers on the project, urging them to report promptly any sickness among their hogs, so that investigation could be made and any necessary action promptly taken.

OUTBREAKS REPORTED IN 1914.

From May 1 to December 31, 1914, 78 cholera outbreaks were reported to the writer. The number of outbreaks reported each month are shown in Table IV.

TABLE IV.—*Cholera outbreaks reported on the North Platte Reclamation Project from May to December, inclusive, 1914.*

Month.	Number of out- breaks.	Percent- age of total.	Month.	Number of out- breaks.	Percent- age of total.
May.....	6	7.7	October.....	11	14.2
June.....	2	2.5	November.....	9	11.5
July.....	10	12.8	December.....	4	5.0
August.....	21	27.0	Total.....	78	100.0
September.....	15	19.2			

As shown in Table IV, most of the outbreaks occurred in July, August, September, and October. It is probable that the large number of outbreaks during these months was due chiefly to the relatively high temperatures and to the greater use of irrigation water during that period. Causes other than these doubtless had their effects, but it appears that these two were the most important. It was definitely ascertained during the summer that about 36 per cent of the outbreaks resulted from infection carried by irrigation water, and it is possible that many more were due to the same agency.

CONTROL WORK.

The control work in 1914 was based chiefly on three things: (1) Securing and placing into effect a quarantine order; (2) securing from the farmers prompt reports of the appearance of the disease, the reports being followed by the treatment of the hogs in the infected herds; and (3) the improvement of sanitary conditions, both in herds where the disease was present and also as a preventive in other herds. Arrangements were made with the State serum plant at Lincoln whereby a supply of serum was kept on hand at Mitchell.



so as to be available for prompt use. It was thus frequently possible to treat a herd on the same day that the disease was reported, and in this way to save a greater proportion of the hogs than would have been possible had it been necessary to wait for the serum to be shipped from Lincoln. The serum is furnished to the farmers at cost, which in 1914 was 1 cent per cubic centimeter plus express charges.

*Quarantine order.*—In order to prevent further importation of diseased hogs to the project, an arrangement was made whereby the Nebraska State Live-Stock Sanitary Board issued a quarantine order under date of July 1, 1914. This quarantine covers the counties of Scotts Bluff, Morrill, Box Butte, and Banner, and the south half of Sioux County. These counties include the drainage basin of the district lying in Nebraska adjacent to and including the North Platte project. The quarantine order requires that all hogs shipped into these four and one-half counties other than for immediate slaughter shall be accompanied by a health certificate showing that they have been immunized against hog cholera. The order also provides that after an outbreak of hog cholera on any farm the premises must be thoroughly cleaned up and disinfected.

*Methods of treatment.*—In treating a herd for cholera the following plan was adopted: Those hogs which showed visible signs of sickness were not treated but were either killed or placed in a quarantine pen, where they remained until they either died or recovered. The other hogs in the herd were treated with antihog-cholera serum. Those having normal temperatures were treated with 40 c. c. of serum per 100 pounds of live weight, and those having temperatures of 104° F. or higher were given a somewhat increased dose of serum, the average increase being 30 to 50 per cent. After the herd was treated it was carefully watched and any hogs which later showed visible signs of sickness were placed in the quarantine pen. The reason for confining the sick hogs in the quarantine pen was to prevent them from spreading infection. Where infection is confined chiefly to a small area it is much easier to control it than where the hogs are allowed to run at large. When, as in this work, the serum-alone treatment is given, the immunity lasts only from 30 to 90 days, and it is therefore necessary that measures be taken to prevent the spread of the infection. For this reason, after the treated hogs ceased to show signs of sickness the premises were thoroughly cleaned and disinfected.

When the above plan was carried out by the farmers according to directions no reinfection occurred. In a few instances, however, where sick animals were allowed to run with the rest of the herd or where the premises were not properly cleaned up and disinfected,



reinfection occurred. This must be attributed to a lack of proper sanitary precautions rather than to ineffectiveness of the treatment.

*Results secured.*—From July 1 to December 31 personal visits were made to 265 herds. The number of herds visited each month from July to December, together with a numerical statement of the treatment applied for cholera and the results accomplished, are given in Table V.

TABLE V.—*Herds of hogs visited and cholera treatment given on the North Platte Reclamation Project from July 1 to December 31, 1914.*

Item.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Herds visited:							
Number.....	37	64	41	47	51	25	265
Hogs represented.....	3,219	5,983	2,499	4,347	4,943	2,738	23,729
Treated for cholera:							
Number of herds.....	9	26	20	11	10	5	81
Number of hogs.....	790	1,373	904	850	660	310	4,887
Treated hogs lost:							
Number.....	100	299	184	135	41	40	799
Per cent.....	12.6	21.7	20.3	15.8	6.2	12.9	16.3
Cost of serum.....	\$230	\$652	\$431	\$551	\$275	\$199	\$2,338
Approximate saving as the result of treatment.	\$3,461	\$9,360	\$5,523	\$3,035	\$3,662	\$927	\$25,968

Table V shows that of the 265 herds visited during the six months ended December 31, 1914, the cholera treatment was applied in 81 herds<sup>1</sup> and that 4,887 of the 23,729 hogs represented in the herds visited were treated. The average number of treated hogs lost varied from 6.2 per cent in November to 21.7 per cent in August. The total loss during the 6-month period amounted to 16.3 per cent of the treated hogs. On the average, for each hog that died after treatment five hogs were saved. This average loss would probably have been lower if all the farmers whose hogs were treated had been as careful as some farmers were.

In individual cases where the disease was promptly reported and where proper sanitary measures were taken, the results were much more satisfactory than those indicated in Table V. This is illustrated by the results secured in seven herds, including 920 hogs, when the appearance of the disease was promptly reported, as shown in Table VI. A herd of 312 shotes in which treatment was promptly applied is shown in figure 3.

On the whole, the results secured in 1914 were by no means discouraging. It is frequently found that where cholera occurs in a herd and the hogs are not treated, as many as 90 per cent of the hogs are lost. On this basis about 4,400 hogs would have been lost in the 81 herds treated instead of only 799. It is believed that it is quite possible on the North Platte project to reduce the average losses in infected herds if special care is exercised with regard to all factors.

<sup>1</sup> In addition to the 78 herds represented in Table IV, treatment was applied to three herds in which no cholera was present but which were located close to infected herds. No cholera developed in these three herds.

TABLE VI.—*Hogs lost after treatment for cholera in seven herds on the North Platte Reclamation Project in 1914.*

Herd.	Number of hogs treated.	Treated hogs lost.		Herd.	Number of hogs treated.	Treated hogs lost.	
		Number.	Per cent.			Number.	Per cent.
No. 1.....	312	4	1.3	No. 6.....	104	4	3.8
No. 2.....	193	7	4.0	No. 7.....	106	4	3.7
No. 3.....	87	2	2.3				
No. 4.....	28	1	3.6	Total .....	920	28	.....
No. 5.....	90	6	6.6	Average .....			3.1

As Table V shows, it was estimated that the treatment applied to the 81 herds at a cost of about \$2,400 resulted in a saving of \$25,000. This statement is made to emphasize the fact that, while it is rather expensive to combat hog cholera, the expenditure is a good investment. Much can be done by efficient quarantine work and careful sanitation to prevent the spread of the disease. Swine growers should understand this point clearly and appreciate the fact that



FIG 3.—A herd on the North Platte Reclamation Project of 312 Duroc-Jersey shotes, in which the cholera treatment was applied promptly after the herd became infected in 1914. Only four of these hogs were lost.

comparative freedom from damage by cholera is purchasable; that to secure this freedom requires the expenditure of a small amount of money and the application of continuous, careful, systematic effort.

#### OBSERVATIONS MADE IN 1914.

In connection with the hog-cholera work conducted in 1914 a number of observations were made and some information secured which has considerable local value. The principal points on which observations were made are as follows: Sources of infection: the relationship between the ages of the hogs and the losses: the importance of good physical condition in the hogs: and the importance of proper sanitation.

*Sources of infection.*—As previously stated, approximately 36 per cent of the outbreaks in 1914 are known to have been due to infection carried by irrigation water. The sources of infection were investigated in connection with 78 outbreaks. The results of this investigation are shown in Table VII.



TABLE VII.—*Sources of cholera infection in 78 herds of swine on the North Platte Reclamation Project in 1914.*

Source of infection.	Herds infected.		Source of infection.	Herds infected.	
	Number.	Per cent.		Number.	Per cent.
Water.....	28	36	Simultaneous treatment.....	1	1.3
Dogs.....	8	10	Visiting.....	1	1.3
Birds.....	8	10	Undetermined.....	18	23
Harbored infection.....	5	6.4	Total.....	78	100
Contact with other hogs.....	9	11.5			

Table VII shows clearly the danger of spreading infection in irrigation water. In this connection, farmers have been urged not



FIG. 4.—Hogs in an irrigation lateral on the North Platte Reclamation Project in 1914. This herd contracted cholera two weeks after the photograph was taken. It was found that 36 per cent of the outbreaks reported on the project in 1914 were due to contaminated irrigation water. Hogs should not have access to irrigation canals and laterals.

to allow their hogs to run in irrigation laterals. The practice of allowing hogs free access to these laterals has been altogether too common. Figure 4 illustrates how hogs have been allowed to wallow in ditches. This practice has resulted in a rapid spread of infection. The water-users' association has been urged to pass a resolution prohibiting the farmers from allowing hogs access to irrigation canals and laterals.

Table VII also shows that dogs and birds spread infection. Figure 5 shows pigeons visiting a cholera-infected herd. In order to reduce the activity of these agents in this connection it is necessary that all carcasses, particularly those of hogs which have died from cholera, be burned. Visits made to these carcasses afford one of the



most effective methods whereby infection can be spread by both dogs and birds. It is also necessary that dogs be prevented from running at large, particularly at night, when they can not be watched.

Harbored infection results from a lack of proper sanitary measures. As shown in Table VII, more than 6 per cent of the outbreaks in 1914 resulted from this cause. It is also shown that 11.5 per cent of the outbreaks resulted from allowing sick hogs to run at large and come in contact with other hogs. This practice should be universally discontinued.

*Relation between age of hogs and loss from cholera.*—Ordinarily the mortality resulting from cholera is much higher in young pigs than in mature hogs. From reports received from farmers relative to losses sustained in 1913 and in the early part of 1914 it has been found that the mortality was about as follows when a herd affected



FIG. 5.—Pigeons in a cholera-infected herd on the North Platte Reclamation Project in 1914. Pigeons and other birds are active agents in the spread of infection. They should be kept away from the hogs and hog lots as much as possible.

with hog cholera was allowed to go untreated: With pigs weighing less than 15 pounds the loss averaged about 95 per cent; with shoters weighing from 15 to 125 pounds the loss was about 85 per cent; and with mature hogs the loss averaged about 25 per cent.<sup>1</sup> These figures were used in arriving at the approximate saving following treatment, as shown in Table V. In other words, the actual loss in the herds treated was deducted from the loss which theoretically would have occurred if no treatment had been applied, and the difference in pounds was valued at the current market price for hogs during the month specified in each case.

*Importance of good physical condition.*—It has already been stated that thrifty hogs are better able to resist disease than un-

<sup>1</sup> Dr. M. Dorset, Chief of the Biochemic Division of the Bureau of Animal Industry, says, regarding the loss of mature hogs: "This is a much lower loss than is generally observed, and it must be that a considerable proportion of the mature hogs were immune through previous exposure or previous attacks of the disease."

thrifty hogs. This is true in connection with hog cholera as well as other diseases affecting swine. It is also true that when cholera breaks out in a herd the number of hogs saved decreases as the percentage of the infection at the time of treatment increases. The comparatively large losses following treatment in some of the herds in 1914 were doubtless due to the fact that the disease was not reported until a large percentage of the hogs was infected, as shown by abnormal temperatures and other indications of sickness. The close association of the physical condition of the hogs, the percentage of infection, and the percentage of hogs lost after treatment are shown in Table VIII, which presents the results of observations made on 81 herds in 1914.

TABLE VIII.—*Physical condition, percentage of cholera infection, and losses following treatment in 81 herds of swine on the North Platte Reclamation Project in 1914.*

Hogs infected at time of treatment.	Lost after treatment.	Average number.		Physical condition of hogs.		
		Herds.	Hogs.	Good.	Fair.	Bad.
	<i>Per cent.</i>			<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
0 to 5 per cent.....	0.59	10	689	66	22	12
5 to 10 per cent.....	4.9	5	295	50	50	0
10 to 15 per cent.....	7.0	10	695	44	44	12
15 to 20 per cent.....	9.5	8	365	50	50	0
20 to 30 per cent.....	16.0	8	526	60	40	0
30 to 40 per cent.....	16.4	7	294	67	33	0
40 to 50 per cent.....	17.0	3	123	75	0	25
50 to 60 per cent.....	15.8	9	509	43	30	27
60 to 70 per cent.....	25.4	3	408	67	0	33
70 to 80 per cent.....	53.6	3	174	33	67	0
80 to 90 per cent.....	21.2	6	384	60	0	40
90 to 100 per cent.....	45.4	9	425	11	22	67

Table VIII shows that large losses following treatment were closely associated with a relatively low percentage of hogs in good physical condition and a relatively high percentage of infection at the time of treatment. Physical condition and percentage of infection are not the only factors of importance; the sanitary conditions provided are also an important factor. It is clear, however, that good physical condition is an important factor and that when the disease breaks out in a herd it should be reported immediately, so that treatment may be applied promptly. Every day's delay increases the danger of large losses following treatment.

*Importance of proper sanitation.*—No treatment at present known is effective in controlling or eradicating hog cholera unless careful sanitary measures are practiced. The serum-alone treatment provides immunity for from 30 to 90 days. Unless proper sanitary measures are taken, reinfection is almost certain to cause new outbreaks of the disease. Sanitary measures include the prompt cleaning up and disinfection of hog lots and hog houses and the prompt isolation of sick hogs, so as to minimize the dissemination of hog-



cholera germs. The importance of prompt and vigorous action to provide good sanitary conditions can not be too strongly urged.

#### THE IMPORTANCE OF COMMUNITY ACTION.

The control of hog cholera is distinctly a community matter. The individual farmer working alone is practically helpless in combating the disease. As already stated, infection is carried by irrigation water, birds, dogs, and various other agents. This being true, every swine grower in a community is constantly in danger of having hog-cholera infection brought to his farm. It is to the interest of all swine growers, therefore, to cooperate actively in carrying out the plans for controlling the disease. In this connection each farmer should not only watch his own hogs closely and report promptly any sickness among them, but he should also endeavor to see that any sickness in his neighbor's herds is promptly reported. The sooner the farmers appreciate that the control of hog cholera demands community cooperation and the sooner this is put into practice, the more effective the preventive and control measures will become. On the other hand, whenever the situation is considered from an individual standpoint alone, all the preventive and control measures at present known are likely to fail.

The work already done in connection with hog cholera has shown that comparative freedom from the disease is purchasable and that in order to get this freedom it is necessary for every farmer to be interested not only in the welfare of his own herd but in the herds of his neighbors as well. If the farmers on the project will view this matter from a community standpoint and work together in controlling the disease, there is no reason why hog cholera should be an insurmountable obstacle to the progress of the swine industry on the project.

In this connection the farmers might well consider the formation of neighborhood organizations, the chief object of which would be to insure the enforcement of quarantine regulations, the prompt reporting of disease outbreaks, and the practice of proper sanitary measures. It would perhaps be practicable for the farmers in each of the eight districts named in Table II to form such an organization, or the organization might be based on other geographical units. When the farmers in a community are organized they could choose district leaders and assistant leaders, whose duty it would be to keep a close watch on all the hogs in the community and to see that any necessary action was promptly taken to insure the proper protection of all the swine herds in the neighborhood. The chief functions of such organizations would be to lessen the danger of having cholera brought into the community and to facilitate adequate control of the disease

if it appeared. The cost of such work would be much more than offset by the resulting benefits. Incidentally, the work would have great value in getting the farmers in the community to work together, and this would result in numerous benefits in addition to cholera control.

#### SPECIAL SUGGESTIONS REGARDING THE CONTROL OF HOG CHOLERA.

The following special suggestions regarding the control of hog cholera should be carefully considered by the swine growers on the project:

- (1) The control of hog cholera demands community cooperation.
- (2) Any sickness in the herd should be promptly reported and the sick animals should be immediately separated from the others.
- (3) Sick hogs should be confined in small quarantine pens, to prevent them from spreading infection around the premises.
- (4) The hogs should be kept in a thrifty condition and free from lice and worms.
- (5) Hogs should not have access to irrigation laterals, but should be provided with plenty of clean drinking water.
- (6) Hog lots and hog houses should be kept as clean as possible; wallow holes should be drained.
- (7) When dead hogs are found in the herd the carcasses should be immediately burned, and the carcasses of other farm animals should be treated in the same way.
- (8) Farmers should not go into their own hog lots after visiting others without first thoroughly disinfecting their shoes.
- (9) Farmers should avoid contact with people or animals suspected of coming from cholera-infected farms.
- (10) Hogs should not be allowed to run at large in a cholera-infected area.
- (11) Pigeons and other birds should be kept away from the hogs as much as possible.
- (12) Treatment with antihog-cholera serum is the only known reliable method of checking the spread of cholera when the disease appears in a herd.
- (13) The premises should be thoroughly cleaned up and disinfected after an outbreak of cholera.

#### CANKER SORE MOUTH.

During the spring and summer of 1914 infectious or canker sore mouth caused a large loss of pigs on the North Platte project. In many cases the entire pig crop was lost. The first symptoms of sore mouth are the occurrence of small inflamed spots about the mouth, especially in the gums and lips. Later, these spots become swollen, and deep, necrotic ulcers with white or yellowish centers may be found. After these ulcers slough out, a deep cavity, which has an ulcerated base, remains. Occasionally the gums may slough away so extensively as to involve several of the teeth. The poisonous matter from the ulcers is absorbed into the system of the pigs and death usually results within a week or ten days. When sore mouth



breaks out in a herd it may spread rapidly to all the pigs in the near-by quarters.

It is specially important that an effort be made to prevent this disease from occurring in the herd. As a matter of precaution the feed lots and hog houses should be kept as clean as possible. The manure and litter should be cleaned up at frequent intervals. Once or twice a month the quarters should be sprayed with some good disinfectant and air-slaked lime should be scattered around. Should the disease occur in the herd, the infected pigs should be immediately separated from the others. Only by prompt action in removing the affected pigs from the herd can the rapid spread of the disease be prevented.

In giving medical treatment for sore mouth the work must be prompt and very vigorous if good results are to be obtained. The mouth should be washed out with some good disinfectant. For this purpose a solution of permanganate of potash is very effective. In making the solution an ounce of permanganate of potash should be dissolved in a gallon of water. A very good method for treating pigs is to take them by the hind legs and plunge them head first into the solution. This should be done at least twice a day until the pigs are cured. After dipping, it is well to touch up the ulcers with a small stick of silver nitrate, which may be purchased at any drug store.

On account of the severe nature of the disease and in view of the fact that most of the pigs that recover become "runt," it is usually advisable to dispose of the badly affected pigs rather than to go to the expense of treating them. The best practice is to watch the pigs carefully, so that prompt action can be taken to prevent the spread of the disease.

#### LICE.

During the season of 1914 hog lice were found to be widely prevalent on the project and caused considerable damage in many herds. The damage is much greater than it is commonly believed to be. The lice draw blood from the hog and they also cause irritation of the skin. Thus, they seriously affect both the health and the comfort of the hog. When lice are present in large numbers the hog's growth and thriftiness are greatly interfered with and the animal does not make satisfactory gains. Furthermore, his vitality is so reduced that he is likely to contract such diseases as hog cholera. Because of these facts lice are a serious drawback to the swine industry, and every effort should be made to destroy them and keep them out of the herds.

Young pigs suffer more from lice than older ones do, but hogs of all ages are frequently more or less affected. Lice may first be found

on the thinner parts of the skin. as behind the ears, in the armpits, and on the inside of the thighs. When present in large numbers, they may be found on all parts of the body.

Under date of December 21, 1914. a circular letter, entitled "Prevention and Destruction of Lice on Hogs," was distributed to all the swine growers on the North Platte project. This letter made suggestions regarding the treatment for lice. The use of crude oil or kerosene emulsion was recommended, because of both effectiveness and low cost. Crude oil may be purchased in almost any market and may be applied to the hogs without diluting. Kerosene emulsion is made by dissolving one-half pound of common laundry soap in a gallon of boiling soft water and adding to this solution 2 gallons of kerosene, the mixture then being vigorously stirred. Ten gallons of water is then added and the solution is ready for use.

Either crude oil or the kerosene emulsion may be applied very effectively by means of a spray pump or water sprinkler. When either of these treatments is applied the hogs should be confined in a small inclosure and allowed to remain there for one or two hours, so that, by rubbing together, the animals become thoroughly covered with the oil or emulsion. Dipping vats may be used in applying the crude oil, but they are not very satisfactory where kerosene emulsion is used.

When treating the herd for lice, all the litter around the sleeping quarters should be raked up and burned, and the quarters should be thoroughly sprayed with the solution used in treating the hogs. Whitewash applied to the sides and bottom of the sleeping quarters is also beneficial. It is important to disinfect the sleeping quarters and to keep them clean whether lice are present or not. In this way a serious invasion of the vermin may be prevented.

#### WORMS.

A large number of hogs on the project were affected by worms during 1914. This pest was the cause of considerable loss in many herds. More than 1,000 hogs were treated for worms between July 1 and December 31, and the results were very satisfactory. In these treatments the remedy used was 5 grains of santonin and 5 grains of calomel for each 100 pounds of live weight. This mixture may be fed in the form of a thin slop or it may be mixed dry with a small amount of some such feed as shorts. In either case it is very important that the drugs be thoroughly mixed with the feed before being given to the hogs. In using any worm medicine it is very important to keep the hogs away from feed for 24 hours previous to the treatment.



Another remedy recommended is American wormseed oil. Each 40 to 60 pound pig is given a tablespoonful of castor oil to which 40 drops of American wormseed oil has been added. This is given in milk or in a mash. For hogs weighing more than 60 pounds, slightly increased doses of the oil are used, up to 55 drops for a mature hog.

Turpentine, used at the rate of  $1\frac{1}{4}$  teaspoonfuls per 100 pounds live weight, followed by a dose of salts (one-half teaspoonful), also gives good results. The latter treatment, however, is not usually as effective as the two treatments previously mentioned.

It is very important that some treatment be applied when hogs are affected by worms. The worms so injure the health of the animals that they are more susceptible to diseases and are also less thrifty.

#### FUTURE DEVELOPMENT OF THE INDUSTRY.

Considering the progress made by the swine industry on the North Platte project during recent years, there seems to be no doubt that the industry can be considerably extended. With the abundance of feeds suitable for hogs and with the numerous other favorable conditions the industry should, within the next five years at most, so develop that the annual exportation of hogs will equal a million dollars. This money will be in the nature of clear gain; that is to say, it will be brought into the project without any important amount of money having gone out of the project. It will represent an important part of the farmers' receipts from the crops produced.

It is planned that the demonstration work continue to be directed toward assisting in extending and improving the swine industry in the valley. In this connection the work in combating hog cholera will be continued. It is hoped that the farmers will, to a greater extent than ever before, appreciate the necessity for community action in controlling this disease, and that closer cooperation than has heretofore been had will be brought about. In addition to the work on hog cholera a campaign will be carried on looking toward the more efficient control of other diseases and of the various pests affecting swine. Canker sore mouth is a disease to which the farmers should pay more careful attention, and a more serious effort should be made to combat such pests as worms and lice. In connection with all these diseases and pests better sanitation will be urged.

There is room for a great deal of improvement in the feeding and housing methods followed on the project. There seems to be no doubt that better results could be obtained if more grain was produced, to be fed in connection with alfalfa pasture. Improved methods of pasturing alfalfa should be followed and housing facilities should be made more efficient and convenient.

There is need for swine-breeders' associations. Such associations could do much toward bringing about improvement in the quality of hogs grown and also in the methods of marketing fat hogs and breeding stock. Associations should also be helpful in bringing about a better breed standardization.

In connection with the above lines of work the farmers should feel free to request the services of the writer at any time. In this way information available in the Department of Agriculture and at the State University can be brought to every farm on the project, and this would be helpful in bringing about a decided improvement in conditions.

In conclusion, it is urged that the farmers consider the swine industry as one of the very best methods of disposing of the crops produced. The crop-disposal problem is perhaps the most important one confronting the farmers in the valley, and the swine industry appears to offer one of the best methods of solving it. It is urged also that the industry be looked upon as a community affair and that those interested learn to take advantage of the opportunities of working together in such matters as can be handled to better advantage by groups of farmers than by farmers working individually.

Approved:

WM. A. TAYLOR.

*Chief of Bureau.*

JULY 22, 1915.





